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IDENTIFIERS Idaho

ABSTRACT

This Technical Committee Report prepared by industry representatives in Idaho lists the skills currently necessary for an employee in that state to obtain a job in drafting and design technology, retain a job once hired, and advance in that occupational field. (Task lists are grouped according to duty areas generally used in industry settings, and are used as the basis for modules in the statewide curriculum guide development process and for generating student profiles.) The first section of the guide is the task profile, which provides the Idaho code number for the occupation and outlines major concepts/content, laboratory activities, teaching considerations, and intended outcomes. The guide then lists the following 25 task areas with subtasks (competencies) for drafting and design technology: employability skills; orientation; basic drafting skills; technical mathematics; multiview drawings; sectional views; auxiliary drawings; basic dimensioning; pictorial drawings; sheet metal developments; drafting applications; basic charts and graphs; computer skills; computer-aided drawings; architectural drawings; structural drawings; civil drawings; electrical/electronic drawings; pneumatic/hydraulic drawings; mechanical drawings; electrical/electronic drawings; advanced computer-aided drawings; advanced mechanical drawings; tool and die drawings; and basic surveying skills. (KC)

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Vo.Ed. 210T

TECHNICAL COMMITTEE REPORT FOR
DRAFTING & DESIGN
TECHNOLOGY

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IDAHO

VTE
VOCATIONAL TECHNICAL EDUCATION

STATE DIVISION OF VOCATIONAL EDUCATION

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INTRODUCTION

The curriculum development process undertaken by the Idaho Division of Vocational Education involves the active use of industry personnel. Industry personnel comprise the sole membership on Technical Committees which are responsible for the development of Task Lists for each program. A Technical Committee Report is prepared on completion of the Committee's assignment. This publication is the Technical Committee Report.

The Task List prepared in the Technical Committee Report reflect the current trends and skills necessary for an employee to: 1) Obtain a job in Idaho's industry, 2) retain a job once hired, and, 3) to advance in the occupational field. Task Lists are grouped according to Duty areas generally used in industry settings. Duty areas are used as the basis for modules in the Statewide Curriculum Guide development process. The Technical Committee segment is the single most significant step in the curriculum development process. All future curriculum activities are predicated on the premise that an accurate picture of industry needs are reflected in the Task List.

Instructional personnel are selected to develop the Statewide Curriculum Guide. These instructors write Performance Objectives for each Task and the subsequent Enabling Objectives for each Performance Objective. The committee members prepare all material in a competency-based format so as to have an effective and efficient methodology for determining student progress. The Statewide Guides are designed as the prime determiner of program content. All programs must follow the established Guide in order to be approved for operation. Any deviation from this Guide requires written approval from the respective program supervisor at the Division of Vocational Education. It is not the intent of the Division that all programs be designed to be exactly the same, but assurance is needed to ensure that the program meets the minimum standards for operation, based on the community needs, equipment, and facilities available to the local school or institution.

The Technical Committee Report does not dictate the level of instruction. The Task List developed represents the entire occupational field. Schools and Institutions determine what skills can be taught and what depth of instruction can be provided. They must choose the Tasks to be taught from the Technical Committee Report but are free to determine how many or which ones can be incorporated into their program.

The Technical Committee Report is also used as the primary list for generating Student Profiles. These Profiles are used as a cumulative record of each student's progress. They are printed in a folder format and have levels of performance scales for each Task so that student competence can be recorded for individual skills or tasks. This document will become the main component for Articulation activities in the event that the student desires to go on for additional training or education.

ACKNOWLEDGEMENTS

The Technical Committee process involves personnel from industry who are selected by the Division with assistance from the State Council on Vocational Education. People who serve on the Committees are nominated by local administrators. They generally come from local advisory committees for existing Vocational Education programs or are community representatives in a capacity to provide the necessary information about industry needs. These people serve with the approval of their employers and give their time and energies to the project without cost. The Division provides reimbursement for per diem and travel. We are indebted greatly to these industry representatives and to their employers for the resources so freely given to the pursuit of ensuring that Idaho students receive the most current training and education possible and that which is demanded by industry.

To this end, the Division recognizes the following people who served on the Drafting Technical Committee: Carl Henrikson, Boise; Tom Ensley, Caldwell; Dick Lindquist, Idaho Falls; Lloyd Lohf, Post Falls; Ken Helm, Lewiston; Warren Cordingley, Hailey, and Deon Romrell, Idaho Falls.

Your support and assistance was very greatly appreciated. Your patience for enduring the educational process is also noted. The students and instructional staff will be much more able to accomplish their respective goals as a result of your contributions.

Sho Ueda, Supervisor
Trades, Industrial and Technical Education

Don Eshelby
Director of Program Services

CURRICULUM FRAMEWORK

PROGRAM AREA: TRADE AND INDUSTRIAL

IDAHO DIVISION OF VOCATIONAL EDUCATION

REVISION DATE: May 1990

PROGRAM TITLE: DRAFTING & DESIGN TECHNOLOGY

IDAHO CODE NUMBER: 6130

CIP#: 48.0101 & 15.0202

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- I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment as drafters (007.281-018), or to provide supplemental training for persons previously or currently employed in these occupations.

The content includes, but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, drafting standards, math skills and drafting office practices to assist mathematical, electrical and electronic, architectural, chemical, civil, or other engineers in the design and drafting of electrical circuits, machines, structures, weldments or architectural plans and the development of detailed working drawings and related specifications for mechanical devices and machinery including production drawings, jigs and fixtures, tools and dies, pneumatic/hydraulic applications and advanced computer aided drawings.

- II. **LABORATORY ACTIVITIES:** Shop or laboratory activities are an integral part of this program and provide instruction in drafting machines, office reproduction equipment, drafting tools, computer aided design systems, drafting track, technical publication and reference materials, drafting materials, and supplies common to industry.

- III. **SPECIAL NOTE:** The Vocational Industrial Clubs of America, Inc., is an appropriate vocational student organization for providing leadership training experiences and reinforcing specific vocational skills. When provided, these activities are considered an integral part of this instructional program.

The cooperative method of instruction may be utilized for this program. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks relevant to the occupation the student has chosen as a career goal. The student must receive compensation for work performed.

The typical length of this program for the average achieving student is 1800 hours for postsecondary or 900 hours for secondary. Multi-period blocks of instruction are required for secondary programs.

IV. **INTENDED OUTCOMES:** After successfully completing this program, the student will be able to:

01. Demonstrate employability skills and habits.
02. Demonstrate knowledge of orientation information.
03. Apply basic drafting skills.
04. Solve technical mathematical problems.
05. Prepare multi-view drawings.
06. Prepare sectional views.
07. Prepare auxiliary drawings.
08. Apply basic dimensioning.
09. Prepare pictorial drawings.
10. Prepare sheet metal developments.
11. Utilize drafting applications.
12. Prepare basic charts and graphs.
13. Perform basic computer skills.
14. Prepare basic computer aided drawings.
15. Prepare basic architectural drawings.
16. Prepare basic structural drawings.
17. Prepare basic civil drawings.
18. Prepare basic electrical/electronic drawings.
19. Prepare basic pneumatic/hydraulic drawings.
20. Prepare basic mechanical drawings.
21. Prepare advanced electrical/electronic drawings.
22. Prepare advanced computer aided drawings.
23. Prepare advanced mechanical drawings.
24. Prepare tool and die drawings.
25. Apply basic surveying skills.

V. **LEVEL OF INSTRUCTION:** The tasks in this program are rated according to the level of skills required for: (a) entry level for employment, (b) retention level for those employed in drafting technology, and (c) advanced level for those skills required of experienced or specialty oriented draftpersons. The following codes represent the skill level of the tasks.

- E Student is introduced to the concepts and is familiar with basic operational functions. This level denotes basic instructional content necessary to enter the job market.
- R Student can perform the activity with minimum supervision. This level denotes instructional level necessary to retain a job.
- A Student can perform the activity without supervision and will meet industry standards. This level denotes advanced skill training necessary for job retention and promotion.

STUDENT PERFORMANCE STANDARDSEFFECTIVE DATE: May 1990PROGRAM AREA: Trade and Industrial

SECONDARY: _____

PROGRAM TITLE: Drafting & Design Technology

POSTSECONDARY: _____

01.0 DEMONSTRATE EMPLOYABILITY SKILLS AND HABITS

The student will be able to:

- E 01.01 Identify employment opportunities.
- E 01.02 Apply employment seeking skills.
- E 01.03 Interpret employment capabilities.
- E 01.04 Demonstrate appropriate work behavior.
- E 01.05 Maintain safe and healthy environment.
- E 01.06 Maintain business-like image.
- E 01.07 Maintain working relationships with others.
- E 01.08 Communicate on the job.
- E 01.09 Adapt to change.
- E 01.10 Understand how a business works.
- E 01.11 Perform mathematical skills.

02.0 DEMONSTRATE KNOWLEDGE OF ORIENTATION INFORMATION

The student will be able to:

- E 02.01 Identify school regulations, classroom procedures and grading practices.
- E 02.02 Apply safety practices.
- E 02.03 Identify drafting careers and occupational concepts.
- E 02.04 Identify course overview.
- E 02.05 Locate resource materials and audio-visual training equipment.
- E 02.06 Use reproduction equipment i.e., blueprint machines and office copy equipment.

03.0 APPLY BASIC DRAFTING SKILLS

The student will be able to:

- E 03.01 Apply safety practices.
- E 03.02 Use drafting equipment, measuring scales, drawing media, drafting instruments and consumable materials.
- E 03.03 Use conversion tables for fractions, decimals and metric measurements.
- E 03.04 Identify line styles, weights (alphabet of lines).
- E 03.05 Prepare title blocks and other drafting formats.
- E 03.06 Apply various freehand and other lettering techniques.
- E 03.07 Apply axonometric, oblique and perspective sketching techniques.
- E 03.08 Prepare axonometric, oblique and perspective sketches.
- E 03.09 Interpret reports and specifications.

- E 03.10 Prepare multi-view drawings.
- E 03.11 Prepare sectional views.
- E 03.12 Prepare auxiliary views.
- E 03.13 Prepare dimension drawings.
- E 03.14 Prepare pictorial drawings.
- E 03.15 Prepare multi-view sketches.
- E 03.16 Apply inking techniques.
- E 03.17 Apply systems drafting techniques.
- E 03.18 Compile a portfolio.

04.0 SOLVE TECHNICAL MATHEMATICAL PROBLEMS

The student will be able to:

- E 04.01 Solve arithmetic problems.
- E 04.02 Solve algebra problems.
- E 04.03 Solve trigonometric problems.
- E 04.04 Solve geometry problems.
- E 04.05 Apply multiple discipline calculations.

05.0 PREPARE MULTI-VIEW DRAWINGS

The student will be able to:

- E 05.01 Select proper drawing scale, views and layout.
- E 05.02 Prepare drawings containing horizontal and vertical surfaces.
- E 05.03 Prepare drawings containing circles and/or arcs.
- E 05.04 Prepare drawings containing incline surfaces.
- E 05.05 Prepare drawings incorporating partial views.
- E 05.06 Prepare drawings incorporating removed details and conventional breaks.

06.0 PREPARE SECTIONAL VIEWS

The student will be able to:

- E 06.01 Prepare drawings containing full sections and half sections.
- E 06.02 Prepare drawings containing offset sections.
- E 06.03 Prepare drawings containing revolved sections.
- E 06.04 Prepare drawings containing removed sections and broken-out sections.
- E 06.05 Prepare a sectional-assembly drawing applying material symbols.

07.0 PREPARE AUXILIARY DRAWINGS

The student will be able to:

- E 07.01 Prepare drawings containing primary auxiliary views.
- E 07.02 Prepare drawings containing auxiliary views that include curved lines.
- E 07.03 Prepare drawings containing auxiliary sections.
- E 07.04 Prepare drawings containing secondary auxiliary view.

08.0 APPLY BASIC DIMENSIONING

The student will be able to:

- E 08.01 Prepare drawings containing linear standard dimensions and notes.
- E 08.02 Prepare drawings that include angular standard dimensions.
- E 08.03 Prepare drawings that include circular standard dimensions.
- E 08.04 Prepare drawings using metric dimensions.
- E 08.05 Prepare drawings using surface characteristic notations.

09.0 PREPARE PICTORIAL DRAWINGS

The student will be able to:

- E 09.01 Prepare isometric drawings.
- E 09.02 Prepare dimetric drawings.
- E 09.03 Prepare cavalier drawings.
- E 09.04 Prepare cabinet drawings.
- E 09.05 Prepare one and two point perspectives.

10.0 PREPARE SHEET METAL DEVELOPMENTS

The student will be able to:

- E 10.01 Prepare drawings with sketchouts of prisms, cylinders, cones and pyramids.
- E 10.02 Prepare sketchouts of a transition piece.
- E 10.03 Prepare drawings involving intersecting pieces.

11.0 UTILIZE DRAFTING APPLICATIONS

The student will be able to:

- E 11.01 Use the various drafting and graphic appliques.
- E 11.02 Use cut and paste techniques.
- E 11.03 Identify photo techniques.
- E 11.04 Prepare overlay drawings.
- E 11.05 Make drawing changes on a sepia.

12.0 PREPARE BASIC CHARTS AND GRAPHS

The student will be able to:

- E 12.01 Prepare bar, pie, and flow charts.
- E 12.02 Prepare rectangular and semi-logarithmic graphs.

13.0 PERFORM BASIC COMPUTER SKILLS

The student will be able to:

- E 13.01 Use a full size standard keyboard.
- E 13.02 Use a dual disc drive console.
- E 13.03 Use a monitor.
- E 13.04 Use a disk operating system (DOS).
- E 13.05 Use a hard disk.
- E 13.06 Use a translation utility format.
- E 13.07 Demonstrate a knowledge of commands required to operate a specific computer software program.

14.0 PREPARE BASIC COMPUTER AIDED DRAWINGS

The student will be able to:

- E 14.01 Use a digitizer.
- E 14.02 Use a plotter.
- E 14.03 Select the proper drawing scale.
- E 14.04 Produce charts and graphs.
- E 14.05 Produce multi-view drawings with dimensions.
- E 14.06 Produce sectional view drawings with dimensions.
- E 14.07 Produce auxiliary view drawings with dimensions.
- E 14.08 Produce pictorial drawings.

15.0 PREPARE BASIC ARCHITECTURAL DRAWINGS

The student will be able to:

- R 15.01 Interpret vendors' catalogs, technical tables and building codes.
- R 15.02 Prepare floor plan drawings, with dimensions.
- R 15.03 Prepare foundation plan and detail drawings, with dimensions.
- R 15.04 Prepare elevation drawings with dimensions.
- R 15.05 Prepare sections with dimensions.
- R 15.06 Prepare schedules.
- R 15.07 Prepare landscape layouts.
- A 15.08 Build architectural models.
- A 15.09 Prepare truss drawings.
- A 15.10 Prepare stairway drawings.
- A 15.11 Prepare fireplace drawings.
- A 15.12 Prepare plot plan drawings.
- A 15.13 Prepare plumbing plan drawings.
- A 15.14 Prepare HVAC drawings.
- A 15.15 Prepare electrical plan drawings.

16.0 PREPARE BASIC STRUCTURAL DRAWINGS

The student will be able to:

- R 16.01 Use structural member and reinforcing concrete manuals and technical tables.
- R 16.02 Detail structural beam connections.
- R 16.03 Detail concrete reinforcements.
- R 16.04 Prepare materials take off lists.
- A 16.05 Draw structural framing plans and elevations.
- A 16.06 Identify welding symbols.

17.0 PREPARE BASIC CIVIL DRAWINGS

The student will be able to:

- R 17.01 Interpret technical standards for soils and construction materials.
- R 17.02 Prepare topographic drawings.
- R 17.03 Prepare drainage drawings.
- R 17.04 Prepare plan and profile drawings.
- R 17.05 Prepare traverse drawings.
- R 17.06 Prepare plat drawings.
- R 17.07 Prepare street layout drawings.
- R 17.08 Prepare contour drawings.

18.0 PREPARE BASIC ELECTRICAL/ELECTRONIC DRAWINGS

The student will be able to:

- R 18.01 Interpret basic electric/electronic standards and symbols.
- R 18.02 Prepare schematic drawings.
- R 18.03 Prepare cable drawings.
- R 18.04 Prepare component drawings.
- R 18.05 Prepare logic diagrams.
- R 18.06 Prepare control panel drawings.

19.0 PREPARE BASIC PNEUMATIC/HYDRAULIC DRAWINGS

The student will be able to:

- R 19.01 Interpret basic pneumatic/hydraulic standards and symbols.
- R 19.02 Prepare piping drawings.
- R 19.03 Prepare isometric drawings.
- R 19.04 Prepare sectional diagrams.
- R 19.05 Prepare graphical symbols.
- A 19.06 Prepare process and instrumentation diagrams.
- A 19.07 Prepare combination diagrams.
- A 19.08 Prepare pump and motor drawings.
- A 19.09 Prepare cylinder and piston diagrams.
- A 19.10 Prepare valve drawings.
- A 19.11 Prepare pump section drawings.

20.0 PREPARE BASIC MECHANICAL DRAWINGS

The student will be able to:

- R 20.01 Interpret basic mechanical standards and symbols.
- R 20.02 Prepare assembly drawings.
- R 20.03 Prepare detail drawings.
- R 20.04 Prepare welding drawings.
- R 20.05 Prepare bearing drawings.
- R 20.06 Prepare casting drawings.
- R 20.07 Prepare forging drawings.
- R 20.08 Prepare tool drawings.
- R 20.09 Prepare molding diagrams.
- R 20.10 Prepare drawings with special processed holes.
- R 20.11 Prepare stamping drawings.
- R 20.12 Prepare numerical control drawings.

21.0 PREPARE ADVANCED ELECTRICAL/ELECTRONIC DRAWINGS

The student will be able to:

- R 21.01 Prepare connection drawings
- R 21.02 Prepare interconnection drawings.
- A 21.03 Prepare printed circuit board drawings.
- R 21.04 Prepare harness drawings.
- A 21.05 Prepare package drawings.

22.0 PREPARE ADVANCED COMPUTER AIDED DRAWINGS

The student will be able to:

- R 22.01 Operate work terminal.
- R 22.02 Utilize system commands.
- R 22.03 Perform drafting procedures.
- R 22.04 Operate peripheral equipment.
- R 22.05 Apply specialized CAD functions.
- A 22.06 Produce architectural drawings.
- A 22.07 Produce structural steel and reinforcing detail drawings.
- A 22.08 Produce map drawings.
- A 22.09 Produce civil drawings.
- A 22.10 Produce electrical/electronic drawings.
- A 22.11 Produce pneumatic/hydraulic drawings.
- A 22.12 Produce pattern shop detail drawings.
- A 22.13 Produce casting drawings.
- A 22.14 Produce forging detail drawings.
- A 22.15 Produce machining detail drawings.
- A 22.16 Produce stamping drawings.
- A 22.17 Produce welding drawings.
- A 22.18 Produce assembly drawings.
- A 22.19 Produce installation drawings.

23.0 PREPARE ADVANCED MECHANICAL DRAWINGS

The student will be able to:

- R 23.01 Identify the various manufacturing methods.
- R 23.02 Resolve problems by descriptive geometry and revolutions.
- R 23.03 Prepare advanced surface drawings.
- R 23.04 Use precision dimensioning to include geometric characters.
- R 23.05 Use precision measuring instruments.
- A 23.06 Make engineering changes on drawings.
- A 23.07 Prepare fastener drawings.
- A 23.08 Prepare cam drawings.
- A 23.09 Prepare gear drawings.
- A 23.10 Prepare spring drawings.
- A 23.11 Prepare pneumatic/hydraulic drawings.
- A 23.12 Prepare pulley and chain drive drawings.

24.0 PREPARE TOOL AND DIE DRAWINGS

The student will be able to:

- A 24.01 Design jigs and fixtures.
- A 24.02 Design cutting dies.
- A 24.03 Design forming dies.

25.0 APPLY BASIC SURVEYING SKILLS

The student will be able to:

- R 25.01 Describe types of surveys.
- R 25.02 Apply different types of measurements.
- R 25.03 Prepare standard notes.
- R 25.04 Operate surveying equipment.
- R 25.05 Perform surveys.

